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RESEARCH ARTICLE

DESIGN AND FABRICATION OF FIXTURE FOR LASER TURNING.

Akshee Shivam and Santanu Chakraborty.
Sikkim Manipal Institute of Technology.

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Abstract

Laser assisted turning is a technology that combines turning and laser heating in order to manufacture difficult machine materials. This research work focuses on designing a fixture that can be used to turn a cylindrical rod of specific dimensions. The fixture is designed using CATIA software and the work piece is made to rotate using a stepper motor controlled by arduino software. The successful design of this fixture contributes to the study laser turning and machining of different materials and optimizing their process parameters to study their various mechanical and tribological properties.

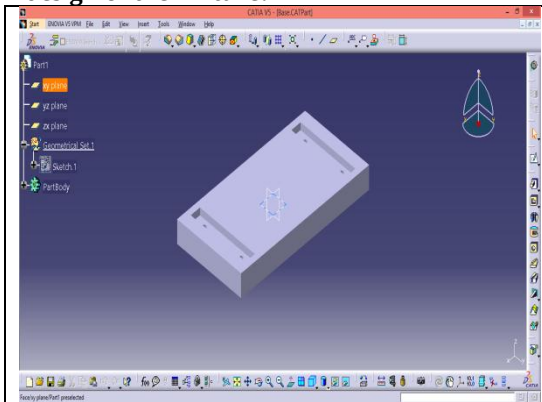
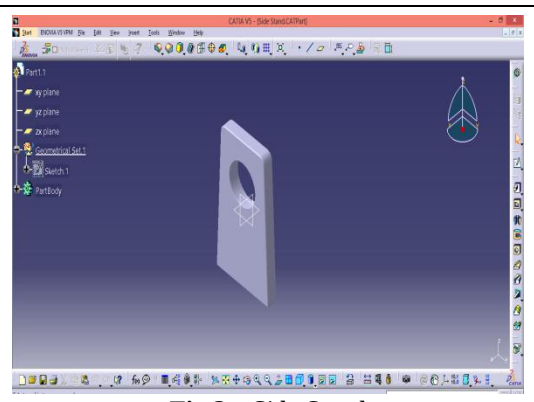
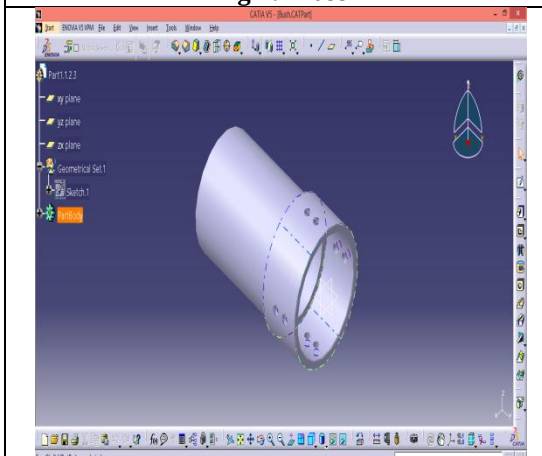
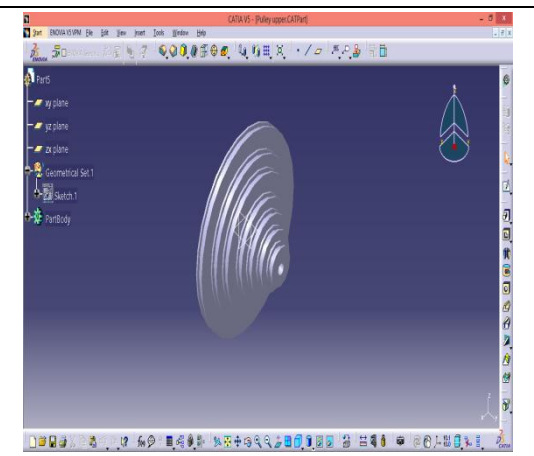
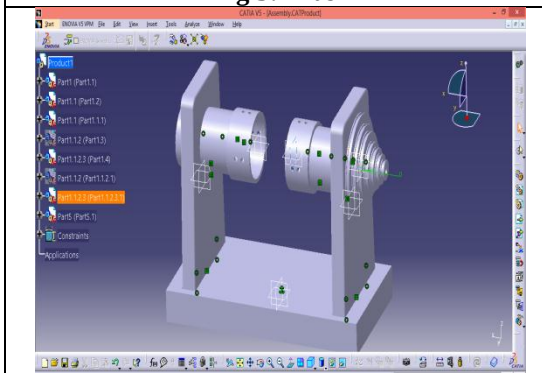
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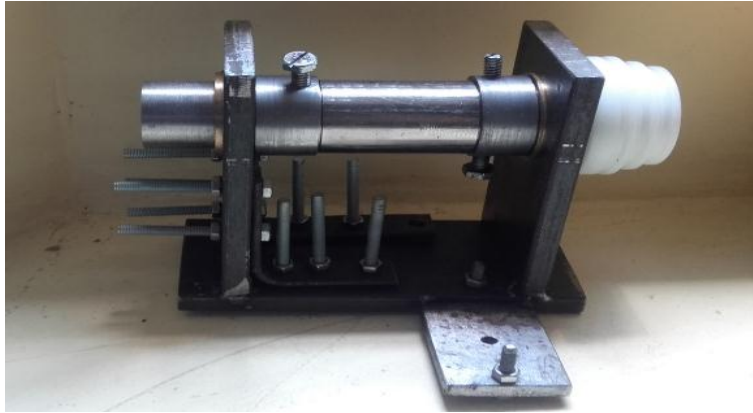
Introduction:-

The fixture is a special tool that is used for holding a work piece in proper position during manufacturing operation. For supporting and clamping the work piece, this device is provided. Frequent checking, positioning, individual marking and non-uniform quality in manufacturing process are eliminated by fixture [1]. This increases productivity and reduces the operation time. Fixture is widely used in the industrial production because of its feature and advantages. Fixtures are used to locate and immobilize work pieces for machining, inspection, assembly and other operations. The designing of a fixture is a highly complex and intuitive process. Considering the need in manufacturing industries, these specialized tool fixtures can be used flexible and inflexible production [2]. Fixture design plays an important role at the setup planning phase of a product design. Proper fixture design is crucial for developing product quality in different terms of accuracy, surface finish and precision of the machined parts. In this project, a CATIA model of a laser turning fixture is developed and fabricated in workshop.

Methodology:-

The methodology proposed for the design and fabrication of the tool fixture includes a two stage realization. First stage is developing the model in CATIA designing tool. Second stage is fabrication of the fixture in mechanical workshop.

CATIA design of the Fixture:-**Fig 1:- Base****Fig 2:- Side Stand****Fig 3:- Bush****Fig 4:- Pulley****Fig 5:- Assembly of the components**

Fabrication of the Fixture:-**Fig 6:-** Fixture.**Stepper Motor:**

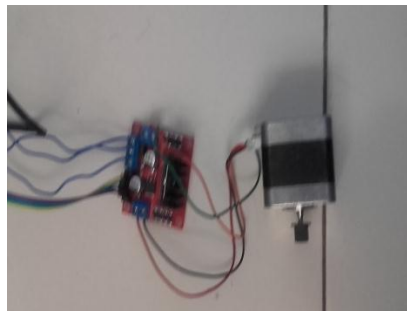
The turning of the work piece is done using a stepper motor of the following specifications:

Voltage: 12-36V

Current: 3.2 A DC

RPM: 200 rev/min

Step angle: 1.8 deg/step

**Fig 7:-** Stepper Motor.**Arduino:-**

The Arduino microcontroller¹ is used in art and design as an open source programmable tool to create interactive works. It can drive motors, LEDs, sensors and other components. Microcontrollers are small computing systems used for low power and low memory purposes. A microcontroller consists of a microchip on a circuit board with read-write capabilities, memory, inputs and outputs [3]. The work piece after being fitted in the fixture is turned using arduino software and hardware. The programming is done in C++ and then the program is being loaded in the arduino board.

**Fig 8:-** Arduino Board

Conclusion:-

The fixture made can turn a work piece that is machined in laser beam machine. The speed of rotation can be easily regulated using stepper motor controlled by arduino circuit loaded with C++ programming. Future scope lies in simulation of this fixture using ANSYS software.

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